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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/049,492

02/12/2002

Jun Sudo

G110-044 US

4081

21706

7590

04/28/2004

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EXAMINER

COCKS, JOSIAH C

ART UNIT

PAPER NUMBER

3749

DATE MAILED: 04/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/049,492

Applicant(s)

SUDO ET AL.

Examiner

Josiah Cocks

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 February 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. Receipt of applicant's amendment filed 2/13/04 is acknowledged.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 1, line 8, the recitation of "within a range" is unclear. Within a range of what? As best can be determined it appears applicant intended to recite --within a range of positions-- and has been regarded as such for the purpose of an examination on the merits.

The term "strong turbulences" in the last line claim 1 is a relative term which renders the claim indefinite. The term "strong" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. For the purpose of an examination on the merits "strong turbulences" has been regarded simply as a --turbulences--.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1, 3, 4, 6, and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Tanaka et al.* (US # 5,441,403).

Tanaka et al. disclose in Figures 1-12 a combustion method substantially as described in applicant's claims 1, 3, 4, 6, and 8-10, including directing air into an air throat (9) that has a plurality of air inlet openings (11) that cause air flows to collide with one another and are then directed to an outlet that is rectangular (i.e. a cross section having a larger specific surface area than a circular outlet) (see Fig. 9). *Tanaka et al.* also disclose a plurality of fuel outlets (4) forming fuel jet flows that surround the air flows are arranged to collide with the central air

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flows and form a flat flame shape (see col. 3, lines 11-19 and col. 6, lines 13-21). Tanaka et al. describes the primary flame formed as a “vortex-like flow” and a “flame vortex effect” which is regarded by the examiner as the recited turbulent of applicant’s claims.

In regard to the claim 1 selecting a furnace temperature of not less than 800 °C is simply a matter of operational choice. The furnace of *Tanaka et al.* would be capable of operating at temperatures above 800 °C.

In regard to claim 9, *Tanaka et al.* teach that it is understood in the art at air to fuel ratios may be adjusted as desired (see col. 4, lines 54-59). To have selected a specific quantity of air or fuel is regarded as simply a matter of engineering choice and is not regarded as patentably distinct.

7. Claims 11, 12, 16, 18, and 24-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Tanaka et al.* (US # 5,441,403).

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Tanaka et al. disclose in Figures 1-12 a combustion furnace having a burner substantially as described in applicant's claims 11, 12, 16, 18, and 24-28, including directing air into an air throat (9) that has a plurality of air inlet openings (11) that cause air flows to collide with one another and are then directed to an outlet that is rectangular (i.e. a cross section having a larger specific surface area than a circular outlet) (see Fig. 9). *Tanaka et al.* also disclose a plurality of fuel outlets (4) forming fuel jet flows that surround the air flows are arranged to collide with the central air flows and form a flat flame shape (see col. 3, lines 11-19 and col. 6, lines 13-21).

In regard to the claim 11, selecting a furnace temperature of not less than 800 °C is simply a matter of operational choice. The furnace of *Tanaka et al.* would be capable of operating at temperatures above 800 °C.

In regard to claims 10, 24, and 25, *Tanaka et al.* teach that it is understood in the art at air to fuel ratios may be adjusted as desired (see col. 4, lines 54-59). To have selected a specific quantity of air or fuel is regarded as simply a matter of engineering choice and is not regarded as patentably distinct.

In regard to claims 26 and 27, as noted above, *Tanaka et al.* discloses an arrangement of fuel and air nozzles that direct fuel and air to collide and form a flat flame in substantially the same manner as described by applicant, the examiner considers that, to have selected specific sizes of the air throat, and specific ratios of the diameter of the air throat to the fuel jet flow axis is simply a matter of engineering design choice and is not given any patentably weight.

8. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Tanaka et al.* as applied to claim 1 above and further in view of *Gitman* (US # 4,453,913).

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Tanaka et al. discloses all the limitations of claim 2 except that the combustion air is pre-heated by combustion exhaust gas.

Gitman discloses a burner in the same field of endeavor as *Tanaka et al.* wherein the burner of *Gitman* is a recuperative burner with regenerative medium that pre-heats combustion air by exposure to exhaust gas heat (see abstract and col. 5, lines 28-40).

Therefore, in regard to claim 2, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method and burner of *Tanaka et al.* to incorporate the preheating of *Gitman* as this preheating desirably contributes to minimizing NOx formation and increasing flame luminosity (see *Gitman*, col. 2, lines 6-22).

9. Claims 5, 7, 17, 19, and 20 rejected under 35 U.S.C. 103(a) as being unpatentable over *Tanaka et al.* as applied to claims 1 and 11 above, and further in view of *Reed* (US # 3,202,203).

Tanaka et al. teach all the limitations of claims 1 and 11 except 5, 7, 17, 19, and 20 possibly that the fuel jet flows collide with each other before coming into contact with the air jet flow.

Reed teaches a burner in the same field of endeavor as *Tanaka et al.* wherein the burner of *Reed* includes multiple fuel nozzles (42, 43, 46, and 47) forming multiple fuel flows wherein the ports are arranged such that the fuel flows are arranged and angles collide as the leave the flows exit the fuel ports (see Fig. 5, and col. 4, lines 10-25).

Therefore, in regard to claims 5, 7, 17, 19, and 20, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the method and burner of *Tanaka et al.* to incorporate the fuel port arrangement and colliding fuel flows of *Reed* as the

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colliding fuel flows cause flattening of the fuel streams as they issue from the fuel ports (see *Reed*, col. 4, lines 18-20) and provide adequate heat and stable combustion (see *Reed*, col. 1, lines 56-67).

10. Claims 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Tanaka et al.* as applied to claim 11 above, and further in view of *Yap* (US # 5,360,171).

Tanaka et al. teach all the limitations of claims 13-15 except possibly that the air throat is divided into a plurality of small holes that are arranged in a line and not independent from one another.

Yap teaches a burner in the same field of endeavor as *Tanaka et al.* wherein the burner of *Yap* includes a rectangular air outlet (92 or 94) that is broken up into non-independent exit holes by means of several vanes (96 or 98) and arranged in a line (see Fig. 6).

Therefore, in regard to claims 13-15, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the burner of *Tanaka et al.* to incorporate the multiple oxidant outlet holes of *Yap* as this arrangement allows for combustion staging that lowers NOx formation (see *Yap*, col. 2, lines 53-61).

11. Claims 21-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Tanaka et al.* as applied to claim 11 above, and further in view of *Mitani et al.* (US # 6,036,476).

Tanaka et al. teach all the limitations of claims 21-23 except for a ceramic honeycomb regenerative medium and flow switching means for alternately leading combustion exhaust gas and combustion air to the regenerative medium.

Mitani et al. teach a burner in the same field of endeavor as *Tanaka et al.* wherein the burner of *Mitani et al.* includes a regenerative medium (3) made of ceramic (see col. 5, lines 1-3) and switching means (21) for switching air supply and exhaust gas (see col. 9, lines 37-45 and Fig. 19).

Therefore, in regard to claims 21-23, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the burner of *Tanaka et al.* to incorporate the regenerative medium and switching means of *Mitani et al.* as these structures desirably aid in the reducing the generation of NO_x (see *Mitani et al.*, col. 8, lines 8-24).

Response to Arguments

12. Applicant's arguments filed 2/13/04 have been fully considered but they are not persuasive. Applicant argues that the "member having air inlet openings is used as a guide pipe for controlling a quantity and a velocity distribution of air introduced to the air throat, and is not means for forming a flat air flow in the furnace." However, as clearly shown in Fig. 4 of *Tanaka et al.*, air is introduced to member (10) from openings (11) that are opposed to one another and would thus serve to cause the air flows to collide as claimed. Further, as shown in the embodiment of Fig. 9 of *Tanaka et al.* the outlet of the member (10) may be rectangular and would form a flat air-flow. Applicant also argues that *Tanaka et al.* would produce a "gentle laminar diffusion flame." However, a person of ordinary skill in the art would recognize that any flame produced by a burner such as disclosed in *Tanaka et al.* could never be a truly laminar flame and would have some turbulence. Further, *Tanaka et al.* does not describe the flame as "laminar" as asserted by applicant, and instead describes the flame as being a flame vortex which

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is regarded by the examiner as a turbulent flame. Applicant's claims are considered to read over the prior art of record.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Josiah Cocks whose telephone number is (703) 305-0450. The examiner can normally be reached on weekdays from 7:30 AM to 5:00 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ira Lazarus, can be reached at (703) 308-1935. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0861.

jcc
April 27, 2004


JOSIAH COCKS
PATENT EXAMINER
ART UNIT 3749